



WELL Study

Effectiveness of promotional techniques in environmental health

Task No: 165

Ben Cave and Dr Valerie Curtis

March 1999

Task Management by: Dr Valerie Curtis
Quality Assurance by: Dr Sandy Cairncross

London School of Hygiene & Tropical Medicine, UK
WEDC, Loughborough University, UK

E-mail: WELL@lshtm.ac.uk
Internet: <http://www.lboro.ac.uk/well/>

TABLE OF CONTENTS

Summary	3
1. Introduction: Changing behaviour; how and how much?.....	3
1.1 Behaviour Change	4
1.2 Health Impact.....	5
2. Methods	6
3. Results	7
3.1 Studies exhibiting desirable methodological characteristics	7
3.1.1 Study based on explicit theory	8
3.1.2 Adapting the intervention	8
3.1.3 Example given of the materials or process employed	9
3.1.4 Adequate description of resources required to carry out programme.....	9
3.1.5 Measured outcome variable before and after the intervention.....	10
3.1.6 Period between education and outcome more than one year	10
3.1.7 Evidence of community participation in design of programme, goals or outcome measures	11
3.1.8 Article claimed to show positive results for intervention evaluated.....	11
3.1.9 Included discussion of possible biases or caveats.....	11
3.1.10 Included p-values or confidence intervals	11
3.2. Evidence of behaviour change	11
4. Discussion.....	13
5. Conclusions	15
References	16
Annex: Summary of published articles consulted	19
Boxes	
Box 1: Health promotion and health education.....	4
Box 2: Criteria for assessing the articles on health education or promotion interventions.....	7
Box 3: Five-stage process used to develop and implement education interventions.....	8
Box 4: Excerpt from Project Salsa Interventions.....	9
Box 5: Articles found to have at least 60% of Loevinsohn's characteristics.....	13

Summary

Behaviour change is a key component in environmental health programmes. However behaviour change is difficult and little evidence is available as to how much behaviour change can be expected from health education and promotion.

- In 1987 Loevinsohn found only three methodologically sound studies with evidence of health impact. One of these showed evidence of behaviour change (increase in contraceptive use).
- We found five further studies published since then which had sufficient rigour to evaluate impact. Four demonstrated health impact. In only two was there clear direct evidence of behaviour change (purchase of water filters).
- Of eleven other studies with sufficient rigour to contribute lessons, only three showed useful evidence of any behaviour change. One was an intensive hand-washing and soap distribution programme in one village, another was a village which decided to give up smoking. The national diarrhoea control programme in Mexico increased sales of ORS 10 fold in 11 years.
- In all other studies behaviour change was not reported, not found or very small.

Poor results stem either from a failure in conception, in execution, or in measurement. Only when better-designed interventions and evaluations take place can we determine why so many efforts appear to fail.

- Better intervention design involves explicitly researching how to change specific behaviour from the outset and using messages about a few behaviours which are simple and cheap to put into practice. Political, social and economic barriers to behaviour change must be assessed and may need to be addressed before the intervention begins.
- Behaviour change can be slow and require intensive or prolonged intervention that may not be replicable or sustainable outside of the context of a research study. Slow, steady long-term progress may be a more appropriate outcome expectation than immediate major impact.
- Better evaluation design requires better process monitoring and evaluation, better measures of behaviour, and more rigour and scepticism. Cost-effectiveness evaluations of successful programmes are urgently needed.

1. Introduction: Changing behaviour; how and how much?

The promotion of healthy behaviour is a major component of current efforts to prevent malaria, diarrhoea, STDs and AIDS, the immunisable diseases, heart and lung disease, malnutrition and other conditions such as unwanted pregnancies. However, good evidence for behaviour change in health programmes in both developed and developing countries is lacking. We do not know if this is because of problems with the design, implementation or evaluation of the interventions or, more seriously, if there are major misconceptions about the behaviour change process itself.

In 1990, Loevinsohn published a literature review of health education in developing countries (1). In this review, he found only three that were rigorous enough to demonstrate their effectiveness and, at the same time, were presented with enough detail to allow the intervention to be duplicated.

Ten years later there have been a number of developments in this field:

- health education has given way to health promotion (2) in theory if not in practice (Box 1);
- there is growing realisation of the importance of behaviour change in environmental health programmes such as those promoting insecticide treated nets (ITN) and water-supply and sanitation;
- further, potentially more rigorous studies and evaluations have been published.

Planners of environmental health programmes need to know whether the promotion of behaviour change is effective and cost-effective and, if so, how they can maximise the impact of their efforts. They also need to be able to estimate the amount of impact they can expect to have on key behaviours with available resources. Whilst it is not possible to answer such questions precisely, it is worth combing the literature that has been published since Loevinsohn's review to see if new light has been shone on these questions.

Box 1: Health promotion and health education

The Ottawa Charter for Health Promotion incorporates elements of traditional concern (personal health skills) with the more recent attention given to community action and environmental and public policy issues[†]. The five key action domains are:

- Building healthy public policy
- Creating supportive environments
- Strengthening community action
- Developing personal skills
- Re-orienting health services

The charter has had wide acceptance as a strategic 'checklist' for health promotion, if not actually being used as a formal strategy. Health education may be seen as the 'communication sphere' of health promotion[‡].

[†] *Ottawa Charter for Health Promotion*, 1986, World Health Organisation, Health and Welfare Canada, Canadian Public Health Association. Ottawa Charter for Health Promotion: Ontario, Canada.

[‡] Tannahill, A., *Health education and health promotion: planning for the 1990's*. Health Education Journal, 1990. 49: p. 194-198.

1.1 Behaviour change

Behaviour change and its resultant health benefits can only be expected if every one of the links in the following chain functions effectively:

- appropriate and feasible safe practices are targeted and a limited number of effective and attractive messages are crafted;
- messages are delivered through appropriate channels, and repeated often enough;
- target groups take in, understand and process the messages;
- target groups are motivated and able to act;
- behaviour change ensues.

Finally, any new behaviours which are adopted in the short term may, or may not be sustained in the long term.

A full understanding of any behaviour change intervention would ideally evaluate success at every one of these points in the process. However this is unlikely to be feasible in practice. At a minimum, measuring behaviour change outcomes is needed to determine the impact of a health programme, and to find ways to modify it, if necessary (3). However, measuring behaviour change is not always straightforward. Questionnaire surveys are often a poor way of finding reliable information on health related practices; especially those that are private or morally loaded. Direct observation of the behaviour concerned can be expensive, intrusive and influence the behaviour in question. It may nevertheless be the best technique available(4). Physical evidence of behaviour change such as sales records of oral rehydration salts (ORS), condoms or vaccination records, may be a good way of assessing whether behaviour change has taken place. However, physical signs alone can be misleading; soap may be present but not used, latrines may have been built but children still defecate on the ground, ITNs and ORS may be bought, but used incorrectly. Some direct observation may still be required to evaluate the impact of an intervention.

1.2 Health impact

Studies to evaluate health programmes have naturally tended to use health as the outcome variable. However this can be a mistake. Health impacts are often small, meaning that large sample sizes are needed to detect them, and distinguishing the 'signal' of the programme impact from the background 'noise' of other events may be impossible.

Whether the outcome measured is behaviour, health, or some other indicator, the best study design is the randomised controlled trial (RCT). However as health promotion is often a community level intervention, it not suitable for individual randomisation. A design which makes a 'before-and-after' comparison between one intervention and one control community has limited value (5,6). Time series designs or randomisation of several communities are other alternatives.

2. Methods

We followed in Loevinsohn's footsteps and conducted a search of published English-language literature to determine:

- the potential effectiveness of the various approaches to environmental health promotion; and
- the appropriate expectations and targets for changes in health behaviour.

We concentrated on published literature for two reasons:

- we assumed published studies would be presented more rigorously; and
- we wanted to review information which is widely available - practitioners must be able to access the studies if the findings are to be of any use.

Articles were included for review if they dealt predominantly with a health education or promotion intervention in a developing country and if an evaluation of the educational manoeuvre was carried out - articles which just describe an educational intervention or discuss the theory of health education are left out (1).

Loevinsohn reviewed articles up to 1987. This search was from 1987 to the present. The IRC and WELL libraries were consulted, as were the authors' personal collections. We used the following computerised databases:

- Medline, Popline, BIDS, and the IRC database.

and searched under the following keywords:

- education, promotion, developing country, diarrhoea, HIV / AIDS, nutrition, malaria, behaviour and marketing.

The search results were put into an Endnote database and are available at the WELL Resource Centre.

3. Results

The computerised searches identified 242 articles of interest. Two reviewers assessed these by title for the characteristics described above and 31 articles were selected for review (7-38).

Of the 31 articles reviewed, 35% of the articles provided enough description to duplicate the project.

60% of the articles included a control group of which 16 (53%) were controlled studies with sample sizes greater than 'two' clusters or 60 individuals.

Seven articles described truly randomised studies (8, 9, 20, 21, 25, 28, 34) and four others described quasi-randomised studies (7, 18, 22, 36).

Most of the articles examined either health status (37%) or health behaviour (83%) as end-points. There was some overlap as 8 articles (26%) reviewed both.

None of the 31 articles reviewed contained all of the positive methodological attributes described above. The five most rigorous studies had 60% or more of the characteristics named by Loevinsohn in Box 2 (10, 12, 17, 20, 34). These are examined in detail here. A further 11 studies were sufficiently rigorous to contribute some further evidence to this review. Brief summaries of the salient points of all of the papers are included in annex 1. Three review articles were also located and lessons extracted (39-41).

- Study based on explicit theory.
- Adequate description of how the strategy was adapted to local conditions.
- Example given of the materials or process employed.
- Adequate description of resources required to carry out programme.
- Measured outcome before and after the intervention.
- Period between the education and outcome more than one year.
- Evidence of community participation in design of programme, goals or outcome measures.
- Article claimed to show positive results for the intervention evaluated.
- Included discussions of possible biases or caveats.
- Included p-values or confidence intervals.

Source: Loevinsohn (1)

Box 2: Criteria for assessing the articles on health education or promotion interventions

3.1 Studies exhibiting desirable methodological characteristics

The desirable characteristics of a study as proposed by Loevinsohn (Box 2) are used as criteria to evaluate the five best studies.

3.1.1 Study based on explicit theory

Levinsohn suggests that interventions are too often based only on epidemiological evidence about disease patterns. However, to change behaviour detailed specific research and planning is needed. Four of the five studies reported doing this:

Box 3: Five-stage process used to develop and implement education intervention

Stage 1. Formative Research.
Stage 2. Developing recommendations for behaviour change.
Stage 3. Development of educational messages.
Stage 4. Development and production of educational materials.
Stage 5. Distribution of educational materials.

Source: Lloyd (10)

- Lloyd (10) describes a five-stage process used to develop mosquito control in Mexico (see Box 3).
- Project Salsa, based on the USA/Mexican border, was organised around a seven-step sequence of planning, intervention and evaluation procedures represented by the acronym ONPRIME: organising, needs/resources assessment, priority-setting, research, monitoring and evaluation (17).
- A diarrhoea education project in Zaïre was based on keeping behaviour change messages to a minimum. This study concentrated on four behaviours (34).
- Pant (20) quotes the Alma Ata declaration suggesting that nutrition education is the most appropriate way to improve the nutritional status of at-risk populations, however no specific behaviour change planning was reported for this study in Nepal.
- The health education intervention in Tayeh's study was carried out in close collaboration with Ghana's National Guinea Worm Eradication Programme. Health education and filter distribution were carried out in the manner of the larger programme, while the health education methods were based on assessing people's knowledge, attitudes and practices (12).

3.1.2 Adapting the intervention

According to Levinsohn, an effective intervention must adapt strategies to local conditions. Three of the five studies described this process:

- The first stage in the *Aedes aegypti* control programme was formative (10). This included qualitative and quantitative research techniques and was critical to the project. It tried to ensure that all relevant issues, for both the community and the population, were addressed. Project staff could then prioritise behavioural factors known to affect *Aedes aegypti* in a context relevant to the local community.
- Project Salsa's funders allowed the community to determine which issues were perceived to be important. Project Salsa formed an advisory council of community representatives affiliated with organisations which could contribute resources and legitimise the interventions.
- Baseline data for Project Salsa were collected from local health departments and health service agencies; other methods included a telephone survey, home interviews, intercept surveys, key informant surveys and an observational study for point-of-purchase assessments (17).

- Staff at the education intervention in Zaïre developed their messages using data from a comparative analysis of diarrhoeal rates established from a community survey, and from ethnographic data and observed hygiene practices. Trainers worked with community volunteers and planned non-formal lessons based on culture-specific experience and to be delivered using songs, stories *etc* (34).
- The description of the vitamin A supplementation does not indicate that the strategy was adapted to local conditions (20).
- The report of the Ghanaian project (12) states that it worked along the lines of Ghana's National Guinea Worm Eradication Programme, but there is no description of how the education strategy was adapted to the local conditions.

3.1.3 **Example given of the materials or process employed**

- Lloyd (10) describes each of the stages in Box 3, laying particular emphasis on stage two, *ie* developing the recommendations for behaviour change.
- Elder provides a number of tables detailing the segments of the population at which Project Salsa was aimed and the interventions for each segment (See Box 4) (17).

Box 4: Excerpt from Project Salsa interventions

Intervention	Timetable	How selected	Incentives for participants	Facilitators	Attendance	Monitoring method
Chronic disease/ CHD risk factor screening	Weekly in a community setting	Epidemiological data indicated a need; good 'PR' for programme	Low cost; immediate feedback	Staff; college students; local health centre staff	Average 40 per screening	Feedback forms ask for suggestions, comments
Cooking classes	10 sessions/ classes; ongoing; active but considering change to video/home-based education	Cultural appropriateness of reaching families through housewives (primary food preparers)	Opportunity for socialisation and to learn new recipes	Staff; student interns	Average six per class	End of class written evaluation, pre/post tests

Source: Elder (17)

- Haggerty (34) refers to the training of the community volunteers and how they were instructed to teach by way of analogy, song and poetry.
- Pant (20) gives no examples of the education process or the materials used.
- In Ghana interviewers were trained to demonstrate how cloth filters should be placed on the household's traditional clay pots and to explain that this would filter out the sediments. The live cyclopooids were shown moving on the filter. This was reported to be a convincing demonstration of the need for filters (12).

3.1.4 **Adequate description of resources required to carry out programme**

- In the Aedes control programme, no details were given of the resources required to visit each household three times. Photo novellas were expensive but thought to be effective.

- Project Salsa was funded over five years by the Henry J. Kaiser Family Foundation and affiliated donors. Resource utilisation is not described (17).
- Haggerty (34) gives no indication of the resources required for the programme in Zaïre. Resources needed to cover 18 separate rural sites must have been considerable.
- Costs were calculated in the Nepal programme. The education was less cost-effective than the capsule distribution programme not because it was less effective but because it was more expensive. The cost per death avoided with capsules was \$73 and with education \$237 (20).
- The cost of the Guinea worm filters was about 150 cedis (then equivalent to US\$0.45) in accordance with the National Eradication Programme. The authors comment that the project was very expensive as local and qualified interviewers and health educators visited each household to demonstrate the benefits of filtering drinking water; 'Such concentrated health education can only be afforded by a research project' (12).

3.1.5 Measured outcome variable before and after the intervention

- In the Aedes project knowledge, belief and practice (KBP) and entomological surveys were conducted before the educational intervention in both intervention and control communities. Entomological surveys were conducted in both communities after the educational intervention (10).
- Though approximately four months was spent collecting baseline information for Project Salsa, most of the evaluation entailed monitoring participation rates and other variables appropriate for community demonstration projects. The overall impact evaluation was conducted by an external contractor. However few projects continued to the date of the evaluation, so only a few outcome measures were available (17).
- The Zaïre project (34) conducted a baseline survey of diarrhoeal morbidity of 2,082 children aged 3-35 months. This was collected between October and December 1987 in 18 geographically separate sites. 300 randomly sampled sentinel families were visited once for prolonged (up to 7 hours) structured observations of child feeding and hygiene practices thought to be related to diarrhoea. The results for behaviour change pre- and post intervention were published as a book chapter (47).
- The vitamin A supplementation programme used a two-stage area probability sample of more than 100 area units in seven of Nepal's seventy-five rural districts. The study looked at the cost of the programme and its impact on health status. Annual censuses collected information on community and household variables while physical and ocular examinations were carried out on all children under 10 years old (20).
- The Guinea worm programme conducted a baseline survey in the dry season (January to June) of 1990 (12). The intervention was implemented in stages in different villages after the initial information was collected. The same field workers made 2 more visits to each household at two-monthly intervals. The results were combined to give a six-month period prevalence. An identical survey was carried out over the same period in 1991 to assess the impact of the intervention.

3.1.6 Period between education and outcome more than one year

Only Project Salsa, the vitamin A and the Guinea worm study were evaluated more than a year after the intervention.

3.1.7 Evidence of community participation in design of programme, goals or outcome measures

Community participation, though desirable, does not mean a project will be sustainable. Three of the five studies mention participation, though only Project Salsa made this an explicit goal.

3.1.8 Article claimed to show positive results for intervention evaluated

Each of the five most rigorous articles claims a positive result (see Box 5). Project Salsa admitted that the results were disappointing with only one significant change in one health indicator in a tiny proportion of the population. A more methodologically sound approach is to define outcome measures at the start and report on this basis. Casting about for encouraging results can throw up “significant” results which are statistical artifacts. The vitamin A project and the diarrhoea intervention showed small but significant health impacts without demonstrating behaviour change. The Guinea Worm programme showed large numbers of filters bought but did not demonstrate use. The Aedes programme’s results suggested some behaviour change but were not conclusive.

3.1.9 Included discussion of possible biases or caveats

Of the five most rigorous studies only the diarrhoea and the Guinea Worm study discussed the limitations of their results and both of these look for explanations of how the impact may have been underestimated. No studies considered the possibility that change was overestimated. None evaluates the null hypothesis: that there was no effect.

3.1.10 Included p-values or confidence intervals

The p-value is the probability value that a test statistic would be as extreme as, or more extreme than, observed if the null hypothesis were true. A study result whose probability value is less than 5% ($p < 0.05$) is considered sufficiently unlikely to have occurred by chance to justify being called ‘statistically significant’ (42). Very few of the articles reported the exact probability value but reported p as being less than 0.05 (see Box 5).

3.2. Evidence of behaviour change

Box 5 lists the outcomes of the studies. Only two, the studies on Guinea worm and diarrhoea, show a clear and unequivocal impact on the behaviour of target populations.

- The targeted behaviour change in the Lloyd paper (10) was elimination of breeding sites for Aedes. Six months after the intervention, the number of household containers found positive for larvae had increased significantly in the comparison group and remained the same in the intervention community. We do not learn if the total number of bottles and jars was affected.
- Project Salsa (17) had a wide target of behaviours to change, both in the community and in institutions. There were no measures of actual health-related behaviour save attendance at heart disease risk-factor screenings, which was the only intervention maintained over the long term.
- Data on the impact of the intervention in Zaïre (34) on behaviour was published elsewhere (47). Structured observation, before and three months after the start of the intervention, indicated that the intervention was responsible for about a 10% reduction in ‘unhygienic’ behaviour, after allowing for the fact that some improvement was also found in the behaviour of the control families.
- In Nepal both interventions (food education and capsule distribution) were effective in improving measures of vitamin A status (20). 80% of the target population received capsules. Knowledge about foods increased dramatically in both groups. The authors suggest there was doubt about mother’s food behaviour change because information was not received or understood, or was inappropriate because mothers did not have the capacity to act on it in some cases. It is, nevertheless, hard to see how the programme

Box 5 Articles found to have at least 60% of Loevinsohn’s characteristics

Author	Location	Study	Results
Lloyd (10)	Yucatan, Mexico	Urban, community-based <i>Aedes aegypti</i> control programme	The total number of bottles and jars ($p<0.01$), the number of disposable bottles and jars ($p<0.02$) and the number of animal dishes ($p<0.02$) which were positive for <i>Aedes aegypti</i> larvae were significantly lower in intervention groups when compared with the comparison groups.
Elder (17)	San Ysidro, USA	Community-owned and operated nutritional health promotion programme	Project Salsa never became greater than the sum of its parts as most elements were not maintained beyond the duration of external funding. The heart health and screening, counseling and referral activities achieved a reduction in cholesterol among high risk group ($F\{1,423\} = 4.22$ $p<0.05$).
Haggerty (34) and (47)	Kikwit, Zaïre	Randomised, controlled trial of an educational intervention to reduce diarrhoea	Children in intervention communities experienced an 11% reduction in the risk of reporting diarrhoea during the peak season ($p<0.025$). The largest differences were seen among children aged 24-35 months. ‘Unhygienic’ behaviour was reduced by 10%.
Pant (20)	Terai and mid-hill areas, Nepal	Nutrition education and mega-dose vitamin A supplementation	At 24 months after the implementation of the project the reduction of risk for xerophthalmia was greater among children whose mothers were able to identify vitamin-A rich foods ($RR = 0.25$, $95\%CI = 0.1-0.62$) than among those who received mega-dose capsules ($RR = 0.59$, $95\%CI = 0.41-0.84$). The risk of mortality at 2 years was reduced for both the nutrition education ($RR = 0.64$, $95\%CI = 0.48-0.86$) and capsule distribution ($RR = 0.57$, $95\%CI = 0.42-0.77$) cohorts. There were doubts about the adoption of food related behaviours.
Tayeh (12)	Northern Region, Ghana	Health education programme to promote the use of cloth filters and reduce the prevalence of dracunculiasis	The impact of filtering was less than expected 56% of the study households bought 802 filters; but only 37% bought at least one filter for every 10 people. A logistic regression model with demographic and behavioural factors showed a significantly reduced risk of infection ($OR=0.80$) among household members who bought at least one filter for 10 household members in comparison with those without filters.

can have succeeded in improving nutritional status without having had some impact on food behaviour.

- Tayeh’s paper (12) focuses on two behaviours: the decision to buy a filter and the decision to use one. 56% of households were persuaded to buy one. Asking people if they used the filter was not a good measure of use, but no better measure was found. Health improvement in the earlier intervention villages was presumably due to correct use of the filters.

4. Discussion

Not one of the five studies that we identified as methodologically sound shows a clear impact on behaviour. Do the other studies contribute anything further? Of the 11 with reasonable rigour, only two showed a clear and major impact on behaviour:

- A small scale hand-washing intervention, where soap and detailed instructions on hand-washing were given at two weekly intervals for four months in one village in Indonesia, showed major and sustainable improvements in behaviour (37,38).
- Groth-Marnat et al (29) describe how a village in Fiji decided to stop smoking. As smoking levels rose due to increased marketing, the village took the decision to become a non-smoking village. Eventually all persons in the village who smoked were able to give up smoking, with specific exceptions (elders, and a visitor) and became nationally known as the village that gave up smoking. Follow up evaluation at 9 and 21 months indicated sustained success. The authors describe how the social cohesion of the village allowed the enforcement of a communal decision which made smoking tabu and morally reprehensible. This was not a conventional study with measured outcomes, but there is no reason to doubt the dramatic impact of the villagers' decision.

Several other papers suggest good results:

- Reported annual sales of ORS packets went from 7.6m to 80 million per year between 1984 and 1993 in Mexico, suggesting that a major behavioural change in diarrhoea management had taken place (43). However, no detailed description of the way in which this was achieved was offered. There have undoubtedly been other comparable major successes in national health promotion programmes. However, few of these are documented in scientific journals.
- In Tanzania large numbers of bed nets were sold in 6 villages, but the reasons why they were bought are not explored (15).
- Kroeger suggested that education had improved reported chloroquine utilisation despite confusing local treatment regimes in two out of three Latin American countries with a malaria education programme (14).

All of the other papers with any rigour showed little or no impact on behaviour. In many of the studies the impression is given that authors search widely for any positive result to report. If this is true, then at least some of the studies are likely to be reporting positive findings which are in fact a result of statistical artifact. On average about 5% of reported results will be "significant" by chance alone. By looking at the results of published studies we probably also under-report studies with a negative result. Studies which conclude that interventions had a negligible or nil effect on behaviour are much less likely to be written up and, if written, to be published.

The review papers are hardly more encouraging:

- Kloos (40) reviewed Schistosomiasis control efforts. Projects in Egypt, Ethiopia and Zimbabwe found that increasing people's knowledge about the parasite and how the disease is transmitted did not cause people to reduce their contact with water. Intensive health education in St. Lucia led to a 92% reduction of water contact, but this effect was not sustained.
- A review of breastfeeding interventions (41) had several successes to report. Most effective was the institution of 'baby-friendly' hospitals and changing the behaviour of institutional players. One hospital achieved an 80% decrease in consumption of formula. Health education increased the duration of exclusive breastfeeding in a number of

studies, especially where interventions were frequent. Social action and legislation also had important and measurable impacts on reported breastfeeding rates. Marketing of breast milk substitutes had a major impact on mothers' behaviour, unfortunately detrimental to the child's health.

- Ebrahim et al (44) reviewed a series of coronary heart disease RCT interventions in the UK; these tackled multiple risk factors and included counselling, education and drug treatments. They found poor or non-existent impact results which, they were satisfied, were not due to failures in measurement. They concluded that health protection through national fiscal and legislative changes should have a higher priority than health promotion applied to general and workforce populations.

“The current concepts and practices of multiple risk factor intervention, primarily through individual risk factor counselling, must not be exported to poorer countries as the best policy option for dealing with existing and projected burdens of cardiovascular disease ... Health protection should be promoted as the mainstay of preventing chronic diseases in poorer countries.” (44, p1672).

If marketing has been successful in promoting smoking and formula feeding there is also some historical evidence that it has had a major positive impact on hygiene in the West. Soap manufacturers have promoted and made soap easily accessible, partly with health messages, but mostly through emotional appeal (45). Social marketing taps into the techniques of commercial marketing to encourage behaviour change. Has it been more successful?

- Social marketers claim excellent results for their efforts but only one scientific evaluation appeared in this review. The study showed no net increase in contraceptive prevalence though the branded 'pill' did increase market share.

Marketing specialists do not, however, expect miracles, in the way some health educators seem to. Take-off curves for some consumer durables in the US shows how behaviour change can be long and slow. For example few colour TVs were sold between their introduction in 1954 and 1962, when sales went over the thousand and climbed steeply from there. Answering machines took four years to take off, as did electric shavers. Blenders took about 14 years for sales to go above 1000 per year (46). One reason why results have been poor for most of the reported studies of health promotion may simply be because most interventions are too short and evaluations too early to show a clear impact.

5. Conclusions

Of the studies published since Loevinsohn's review in 1987, both the five best and the 11 next best studies of the impact of health promotion in developing countries reveal a depressing picture of very little behaviour change for a lot of invested effort.

Whilst almost all authors save Ebrahaim, remain convinced of the value of health promotion, there do seem to be legitimate grounds for doubt. The possibility that health promotion/education is ineffective is the null hypothesis, and should not be ruled out in future studies. However, given that a few interventions have demonstrated major behaviour change, there is still room for optimism.

Changing behaviour requires a chain of events. If the chain fails at any one point then the results will be nil. This may be why results look so disappointing. To resolve the issue both interventions and evaluations need to be better designed.

- Explicit design of behaviour change interventions involving formative research to develop feasible and practical replacement behaviour is needed.
- Messages should concentrate on a limited number of simple cheap and feasible practices.
- When the economic, environmental, institutional or political context is unfavourable, behaviour change may become impossible. In many cases it may be more sensible to concentrate on removing the constraints to behaviour change before attempting to promote behaviour change directly.
- Explicit, measurable and predefined behaviour change outcomes should be set from the outset. Health outcomes can be expensive to measure, complicated to analyse and not very useful in guiding decision making.
- Behaviour change may be slow and may require intensive interventions with many contacts. Results may take three or more years to show.
- Piloting and gradual introduction of interventions with constant monitoring helps to avoid major investments in ineffective activities.
- Marketing may have some useful techniques to teach but social marketing has yet to demonstrate its effectiveness and cost-effectiveness.

Planners and policy makers need to take into account the following points:

- Cost-effectiveness data on behaviour change programmes are urgently needed, but it is only worthwhile doing such evaluations on programmes with evidence of successful outcomes, and there are few of these.
- If results are discouraging in small-scale intensive research-style interventions, they may be even more discouraging in the 'real world' of daily health service difficulties.
- If interventions that get good results are deemed 'expensive' in a research setting, then they may be unaffordable on a large scale in the 'real world'.
- All claims to success in effecting behaviour change should be treated with healthy scepticism.

References

1. **Loevinsohn, B.P.** Health education interventions in developing countries: a methodological review of published articles. *International Journal of Epidemiology*. 19 (4): 788-794 (1990).
2. **Green, L.W. & Kreuter, M.W.** *Health promotion planning: an educational and environmental approach*. Mountain View, CA, Mayfield, 1991.
3. **Cairncross, S.** Health impacts in developing countries: new evidence and new prospects. *Journal of the Institution of Water and Environmental Management*. 4 (6): 571-577 (1990).
4. **Curtis, V. et al.** Structured observations of hygiene behaviour in Burkina Faso; validity, variability and utility. *Bulletin of WHO*. 71 (1): 23-32 (1993).
5. **Kirkwood, B. & Morrow, R.** Community-based intervention trials. *Journal of Biosocial Science*. 10 S: 79-86 (1989).
6. **Blum, D. & Feachem, R.G.** Measuring the impact of water supply and sanitation investments on diarrhoeal disease: problems of methodology. *International Journal of Epidemiology*. 12: 357-65 (1983).
7. **Brown, L.V. et al.** Evaluation of the impact of weaning food messages on infant feeding practices and child growth in rural Bangladesh. *American Journal of Clinical Nutrition*. 56: 994-1003 (1992).
8. **Neyzi, O. et al.** An educational intervention on promotion of breast feeding. *Paediatric and Perinatal Epidemiology*. 5: 286-298 (1991).
9. **Shoham-Yakubovich, I. et al.** Infant feeding practices: an evaluation of the impact of a health education course. *American Journal of Public Health*. 80 (6): 732-734 (1990).
10. **Lloyd, L.S. et al.** The design of a community-based health education intervention for the control of *Aedes aegypti*. *American Journal of Tropical Medicine and Hygiene*. 50 (4): 401-11 (1994).
11. **Sarti, E. et al.** Development and evaluation of a health education intervention against *Taenia solium* in a rural community in Mexico. *American Journal of Tropical Medicine and Hygiene*. 56 (2): 127-32 (1997).
12. **Tayeh, A. et al.** The impact of health education to promote cloth filters on dracunculiasis prevalence in the northern region, Ghana. *Social Science and Medicine*. 43 (8): 1205-11 (1996).
13. **Ekeh, H.E. & Adeniyi, J.D.** Health education strategies for tropical disease control in school children. *Journal of tropical medicine and hygiene*. 91: 55-59 (1988).
14. **Kroeger, A. et al.** Health education for community-based malaria control: an intervention study in Ecuador, Colombia and Nicaragua. *Tropical Medicine and International Health*. 1 (6): 836-46 (1996).
15. **Makemba, A. et al.** Community-Based Sale, Distribution and Insecticide Impregnation of Mosquito Nets in Bagamoyo District, Tanzania. *Health Policy And Planning*. 10 (1): 50-59 (1995).
16. **Marsh, V.M. et al.** Evaluating the community education programme of an insecticide-treated bed net trial on the Kenyan coast. *Health Policy and Planning*. 11 (3): 280-91 (1996).
17. **Elder, J. et al.** Project Salsa- Development and institutionalization of a nutritional health promotion project in a Latino community. *American Journal of Health Promotion*. 12 (6): 391-401 (1998).
18. **Hussain, A. & Kvale, G.** Sustainability of a nutrition education programme to prevent night-blindness in Bangladesh. *Tropical Medicine and International Health*. 1 (1): 43-51 (1996).
19. **Hussain, A. et al.** Impact of a health education program to promote the consumption of vitamin A rich foods in Bangladesh. *Health Promotion International*. 12 (2): 103-109 (1997).

References (cont./)

20. **Pant, C.R. et al.** Impact of nutrition education and mega-dose vitamin A supplementation on the health of children in Nepal. *Bulletin of the World Health Organization*. 74 (5): 533-45 (1996).
21. **Ruel, M.T. & Habicht, J.P.** Growth charts only marginally improved maternal learning from nutrition education and growth monitoring in Lesotho. *Journal of Nutrition*. 122 (9): 1772-80 (1992).
22. **Bolam, A. et al.** The effects of postnatal health education for mothers on infant care and family planning practices in Nepal: a randomised controlled trial. *British Medical Journal*. 316 (7134): 805-11 (1998).
23. **Janowitz, B. et al.** Impact of social marketing on contraceptive prevalence and cost in Honduras. *Stud Fam Plan*. 23 (2): 110-7 (1992).
24. **Kandeh, H.B. et al.** Community motivators promote use of emergency obstetric services in rural Sierra Leone. *International Journal of Gynecology And Obstetrics*. 59 (2): S209-18 (1997).
25. **Mbizvo, M.T. et al.** Effects of a randomized health education intervention on aspects of reproductive health knowledge and reported behaviour among adolescents in Zimbabwe. *Social Science and Medicine*. 44 (5): 573-7 (1997).
26. **Olaniran, N. et al.** Mobilizing the community to utilize obstetric services, Cross River State, Nigeria. *International Journal of Gynecology and Obstetrics*. 59 (2): S181-9 (1997).
27. **Opoku, S.A. et al.** Community education to improve utilization of emergency obstetric services in Ghana. *International Journal of Gynecology and Obstetrics*. 59 (2): S201-7 (1997).
28. **Pauw, J. et al.** A controlled HIV / AIDS-related health education programme in Managua, Nicaragua. *AIDS*. 10 (5): 537-44 (1996).
29. **Groth-Marnat, G. et al.** Tobacco control in a traditional Fijian village: indigenous methods of smoking cessation and relapse prevention. *Social Science and Medicine*. 43 (4): 473-7 (1996).
30. **Alam, N. et al.** Mothers' personal and domestic hygiene and diarrhoea incidence in young children in rural Bangladesh. *International Journal of Epidemiology*. 18 (1): 242-247 (1989).
31. **Bhattacharya, R. et al.** Impact of education in the knowledge and practices of rural mothers and key family members on diarrhoea and its treatment at home. *Journal Of Diarrhoeal Diseases Research*. 6 (1): 15-20 (1988).
32. **Bilqis, A.H. et al.** Promoting sanitation in Bangladesh. *World Health Forum*. 15: 358-362 (1994).
33. **Blum, D. et al.** The Imo State (Nigeria) drinking water supply and sanitation project. 2 : Impact on dracunculiasis, diarrhoea, and nutritional status. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 84: 316-321 (1990).
34. **Haggerty, P.A. et al.** Community-based hygiene education to reduce diarrhoeal disease in rural Zaire: impact of the intervention on diarrhoeal morbidity. *International Journal of Epidemiology*. 23 (5): 1050-9 (1994).
35. **Huttly, S.R.A. et al.** The Imo State (Nigeria) drinking water supply and sanitation project. 1 : Description of the project, evaluation methods, and impact on intervening variables. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 84: 309-315. (1990).
36. **Peterson, E.A. et al.** The effect of soap distribution on diarrhoea: Nyamithuthu Refugee Camp. *International Journal of Epidemiology*. 27: 520-524 (1998).
37. **Wilson, J.M. et al.** Hand-washing reduces diarrhoea episodes: a study in Lombok, Indonesia. *Transactions of The Royal Society of Tropical Medicine And Hygiene*. 85: 819-821 (1991).
38. **Wilson, J.M. & Chandler, G.N.** Sustained improvements in hygiene behaviour amongst village women in Lombok, Indonesia. *Transactions Of The Royal Society Of Tropical Medicine And Hygiene*. 87 (6): 615-6 (1993).

39. **Esrey, S.A. et al.** Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma. *Bulletin of the World Health Organization*. 69 (5): 609-621 (1991).
40. **Kloos, H.** Human behavior, health education and schistosomiasis control: a review. *Social Science and Medicine*. 40 (11): 1497-511 (1995).
41. **Wilmoth, T.A. & Elder, J.P.** An assessment of research on breastfeeding promotion strategies in developing countries. *Social Science and Medicine*. 41 (4): 579-94 (1995).
42. **Last, J.M.** A dictionary of epidemiology, Oxford University Press, 1988.
43. **Gutiérrez, G. et al.** Impact of oral rehydration and selected public health interventions on reduction of mortality from childhood diarrhoeal diseases in Mexico. *Bulletin of the World Health Organization*. 74 (2): 189-97 (1996).
44. **Ebrahim, S. & Davey-Smith, G.** Systematic review of randomised controlled trials of multiple risk factor interventions for preventing coronary heart disease. *British Medical Journal*. 314: 1666-1674 (1997).
45. **Vinikas, V.** *Soft soap, hard sell: American Hygiene in an age of advertisement*. Ames, Iowa, Iowa State University Press, 1992.
46. **Golder, P. & Tellis, G.** Will it ever fly? Modeling the takeoff of really new consumer durables. *Marketing Science*. 16 (3): 256-270 (1997).
47. **Haggerty PA:** Community-based education to reduce diarrhoeal disease in rural Zaïre. In: Cairncross and Kochar VJ eds. *Studying Hygiene Behaviour; Methods, Issues and Experiences*. New Delhi: Sage Publications, 1994 pp 160-171.

Annex 1: Summary of published articles consulted

Article **good evidence *some evidence	Interventions	Behaviour change ascribed to project	Comments
(10)**	Health education to control Aedes aegypti by controlling breeding sites	Index of Aedes aegypti prevalence same in intervention, increased in control. Fewer bottles and jars in intervention group	Importance of formative research to determine local understanding, need for environmental support, eg rubbish collection
(17)**	Multiple, community based and selected interventions	Health centre offers heart screening; 180 people/year pay to have it	Other interventions left little trace after project completion
(34)**	Health education for hand and stool hygiene	No report (11% reduction in diarrhoea)	(10-15% improvement in 'bad' behaviours)
(20)**	Comparison of vitamin A supplementation with nutrition education	Evidence of improved knowledge in nut. ed. group, but no evidence of behaviour change offered (Nutritional status improved in both groups)	Difficulties in implementing nut. ed. include: not receiving, not understanding, not having capacity to act, provision of incorrect information, contradiction with folklore.
(12)**	Filters to prevent Guinea worm infection	56% of households bought filters. (Risk of infection reduced by 20%)	Impact of filters 'less than expected given health education effort' in an intensive research project Hard to find good measure of 'use' of filter
(22)*	RCT of postnatal health education on care and FP at 2 contacts	No impact on mothers' knowledge and practices, slight improvement in FP uptake	Well-designed study. Interventions should be piloted. Information alone is not enough to change behaviour
(33) (35)*	Water, sanitation and health education	No change in hand-washing. Young children failed to use latrines. Water storage improved	Success of health education component was limited; 'could be strengthened'
(30)*	Water supply and health education	Indirect evidence of hygiene behaviour change (Good hygiene practices reduced diarrhoea)	
(7)*	Volunteers taught complementary feeding and BF	Dietary adequacy by 24hr recall 56% of ideal in intervention, 47% of ideal in control (WAZ scores improved significantly)	Socio-economic change needed for better results. Locally designed messages. Simplest, cheapest foods best adopted
(29)*	Smoking cessation with Fijian and Western techniques	Smoking went from 45% of adult males to almost nil, maintained for 2 years	Advertising had raised smoking rates rapidly. Cohesive community made its own decision to stop, tabu ceremony, attachment of moral value.

Annex 1: Summary of published articles consulted (cont./)

Article **good evidence *some evidence	Interventions	Behaviour change ascribed to project	Comments
(43)*	Evaluation of diarrhoea mortality trends/National ORS programme	1984 7.6m packets 1989 24m 1990 37m 1993 80m sold (average annual diarrhoea episodes 5->2.2 same period)	Water, sanitation and immunisation had greater impact on mortality than ORT. Hard to attribute changes over time to specific interventions
(23)*	Soc marketing of Contraceptives	No increase in use of oral contraceptives, but market share increased.	
(14)*	Education for malaria control	Knowledge increased Reported correct use of chloroquine increased significantly in 2/3 countries	Different doses and treatment regimes make local learning how to use chloroquine difficult
(15)*	Sale of bednets in 6 villages	Half to two thirds of estimated needed nets were bought. No data on re-impregnation	Formative research and gradual evolutionary implementation. Convenience and money management major issues. High costs of such programmes not addressed.
(28)	Neighbourhood controlled trial of HIV/AIDS health education	Reported condom use 9-16% in intervention, 9-11% in control women, but among men was greater in control group	Good study. Results hard to interpret and few were significantly different. Costly house to house visits.
(37,38)*	Education on hand-washing and soap provision, and follow-up 2 years later	Reported hand-washing with soap after defecation went from 0-92% and sustained at 56% 2 years later.(Major drop in diarrhoea in first intervention (89%))	Simple single message with means to accomplish provided. About 6-8 house-to-house visits thus resource intensive.
(31)	Education and demonstration of ORT	Increases in knowledge and use of ORT in both groups	Serious flaws in study design
(32)	Evaluation of latrine programme	Shows s-shaped adoption curve	Importance of schools Messages about convenience and smell had more impact than health messages.
(18,19)	Nutrition education to prevent night-blindness	Vitamin A rich food consumption declined	Impact of health education may not be sustainable in a declining socio-economic environment
(24)	Promotion of use of emergency obstetric services	Marginal increase in referrals by community motivators	Quality of available service improvement more important than education/motivation. Civil strife disruption. 'Not cost-effective'.

Annex 1: Summary of published articles consulted (cont./)

Article **good evidence *some evidence	Interventions	Behaviour change ascribed to project	Comments
(16)	Malaria education in bednet programme	Impact on awareness of programme good, understanding of specific messages poorer. No behavioural measure	Programme responds to continuing evaluation. Too short but expensive. Knowledge about malaria also changed without intervention.
(25)	RCT of reproductive health education	Marginal changes in reported sexual behaviour. Change in knowledge	Schools good place to reach adolescents
(8)	Education to promote BF postpartum	High initial impact lost after 2 months.	Impact of intervention low and short-lived
(26)	Education campaign to use obstetric services	Knowledge improved. Usage of services did not.	Inflation, fees, transport costs, strikes made services less accessible.
(27)	Improved obstetric services and education	Usage improved	No way of knowing the impact of the educational component
(36)	Soap distribution in refugee camps	27% less diarrhoea when soap was present	Soap without education was effective
(11)	Health education against Taenia	Significant changes in knowledge. Reports of eating infected pork dropped significantly 6%-1%	Pig cystercercosis dropped significantly but drop in Taeniasis in humans was not significant.
(9)	Health education on infant feeding	BF rates were twice as high in intervention group	Self-selected exposure group
(13)	School Health education for disease control	Knowledge increased No measure of behaviour change	
(21)	Compare nutrition education with/out growth charts	Nutritional indicators improved,	Self selected sample, growth charts made little difference
(44) Review	Review of RCTs for coronary heart disease	4.2% net reduction in smoking overall. (Health impact small and not significantly different from zero)	Fiscal and legislative intervention targeted at smoking and fat has more impact than health promotion
(39) Review	Review of water and sanitation health effects	(65% reduction in diarrhoea mortality in best studies)	Higher health impact where hygiene behaviour is facilitated/promoted

Annex 1: Summary of published articles consulted (cont./)

Article **good evidence *some evidence	Interventions	Behaviour change ascribed to project	Comments
(40) Review	Review of Schistosomiasis control through health education	Most sites no evidence of behaviour change In St Lucia health education led to 92% less water contact but returned to pre-intervention levels after end.	Increased knowledge did not lead to reduced water contact because of factors beyond the control of individuals.
(41) Review	Review of breast feeding promotion via legislation, hospital policy and health education	Modifying hospital policy increased hospital BF from 41% to 88%. 80% decrease in formula use. Social support gave 74% as opposed to 30% BF at 3m. Legislation very effective: eg 35%-12% bottle feeding Education gave 32-51% increase in BF over 7 years.	'Programmes and research designs are poorly described in the literature...vague conclusions' . Free samples and sales promotion implying that BF was difficult were very effective in promoting formula. Single event interventions had little impact

Abbreviations used in this table:

BF breast feeding

FP family planning

ORS oral rehydration solution

ORT oral rehydration therapy

RCT randomised controlled trial

WAZ weight for age Z score